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THE ELECTROBUS

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The following journalistic report appeared in the popular-science monthly Nauk i Zhizn'.

The chief modes of mass transportation of passengers on city streets are, as is well known, the streetcar, trolley bus, and autobus.

The greatest number of passengers per unit time can be transported on streetcars. However, this method possesses essential deficiencies such as inability to maneuver on the street, high noise level, etc. Also, the breakdown of one car will disrupt transportation of the entire line.

On the other hand, the autobus, which is more maneuverable and usually faster in operation, requires more qualified servicing and comparatively expensive fuel. In addition, the exhaust gases are equally unpleasant to passengers and pedestrians alike.

From the viewpoint of advantages and deficiencies, the trolley bus occupies somewhat of a middle ground. It is more maneuverable than the streetcar but significantly more limited than the autobus. The breakdown of one trolley bus does not stop the movement of others on the line; however, in case of breakdown of the overhead lines, transportation over the whole line is adversely affected.

The best vehicle for passenger transportation on city streets could, in time, be some version of the so-called electrobus. Vehicles of this type, operating on storage batteries, already exist, but they are not widely used because of the insufficient supply of energy which can be stored and because of the excessive weight of the batteries.

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Another promising development in this direction is an electrobus equipped with an electric motor-generator geared to a heavy flywheel, or "gyroscope," mounted on a vertical axis. Initially, the flywheel is brought up to full speed (approximately 3,000 rpm) by its associated electric motor from a power source in the garage. When the electrobus is in motion, the electric motor is automatically converted into a generator driven by the stored energy of the flywheel. The generator, in turn, supplies electric current to an electric traction motor geared to the rear axle.

Thus, the electrobus can move freely along the highway without resorting to a continuous overhead power line. It can stand at one place for an hour or longer and still have sufficient motive power in reserve. The friction losses in the flywheel when idling are negligibly small due to the use of special lubrication and roller bearings; in addition, the flywheel operates inside a hermetically-sealed housing filled with hydrogen instead of air. These features enable the flywheel to rotate, without load, for half a day.

The weight and dimensions of the flywheel are governed by the physical dimensions of the electrobus. Computation shows that to drive a 12-ton vehicle, it is expedient to limit the energy storage in the flywheel to permit 5 min of running time, at the end of which the generator should still have a reserve power capacity of 50 kw. Under these conditions, the electrobus range will be 5 km, while the weight of the flywheel will be less than 1,400 kg.

A 5-km route would be too short for a municipal line. Therefore, a supplementary "charging" charger of the electrobus is necessary along the route and can be accomplished successfully during a regular stop. The machine rolls up to the sidewalk at the designated stop and comes in contact, by means of its three movable poles, with a special horizontal cantilever arm. While the passengers are entering and leaving, electrical energy supplied by underground cables permits the flywheel to build up again to a full 3,000 rpm. The power consumed by the electric motor during such charging reaches 200 kw.

Having accumulated, in the course of a half-minute stop, a known amount of energy, the electrobus starts off again. The flywheel will slow down at a rate depending on the expenditure of stored energy. However, since the distance between stops in the city is ordinarily less than one kilometer, the electrobus can be recharged as necessary and the flywheel will always have a high level of reserve capacity.

The electrobus can develop speeds of up to 50 km/hr. In comparison with other transport machines, the electrobus possesses several advantages: it has the maneuverability of the autobus and the same average speed but no disagreeable exhaust gases. The electrobus does not require continuous overhead wires and uses cheaper three-phase current for charging (the trolley car and trolley bus are fed, as is well known, by direct current for which special rectifying equipment is necessary). Finally, the external appearance of streets freed from overhead lines will be greatly improved.

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